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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,646	10/24/2003	John Kevin McCoy	12093/930	8631

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KENYON & KENYON LLP
ONE BROADWAY
NEW YORK, NY 10004

EXAMINER

TSOY, ELENA

ART UNIT	PAPER NUMBER
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1792

MAIL DATE	DELIVERY MODE
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11/06/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/692,646

Applicant(s)

MCCOY, JOHN KEVIN

Examiner

Elena Tsoy

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4 and 6-16 is/are pending in the application.
- 4a) Of the above claim(s) 13-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 and 6-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 18, 2007 has been entered.

Response to Amendment

Amendment filed on October 18, 2007 has been entered. Claims 1, 2, 4, 6-16 are pending in the application. Claims 13-16 are withdrawn from consideration as directed to a non-elected invention.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 11 stands rejected under 35 U.S.C. 112, first paragraph for the reasons of record set forth in paragraph 5 of the Office Action mailed on 2/9/2007, because the specification does not reasonably provide enablement for **unlimited** increase of thermal conductivity compared to that of a fuel arrangement from pure uranium dioxide.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Rejection of claim 11 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been withdrawn due to amendment.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 4, 6-9, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB1035789 in view of Carley-Macaulay et al (US 3164487).

GB'789 in view of Carley-Macaulay et al are applied here for the same reasons as set forth in paragraph 12 of the Office Action mailed on 6/21/2007.

As to claimed pellet form, GB'789 teaches that the nuclear fuel body is made by hot pressing technique in *any desired* size and shape, for example, cylindrical, spherical or the like (See page 3, lines 62-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have made a nuclear fuel body of GB'789 in view of Carley-Macaulay et al in a pellet shape that is conventionally used in the fuel art.

As to use in a light water reactor, the Examiner takes official notice that uranium dioxide fuel of the cited prior art would be suitable for use in light water reactor since Applicants' specification discloses that even a conventional uranium dioxide is satisfactory for use in light water reactor (See page 1, lines 17-18).

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7. Claims 1, 4, 6-9, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carley-Macaulay et al (US 3164487) in view of Nicholson et al (US 3, 035,325) and Mysels (US 4,073,834).

The cited prior art are applied here for the same reasons as set forth in paragraph 13 of the Office Action mailed 6/21/2007.

As to Amendment, pellet shape and use in a light water reactor would be obvious for the reasons discussed above.

8. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB '789 in view of Carley-Macaulay et al/Carley-Macaulay et al in view of Nicholson et al and Mysels/, and further in view of Burnham et al (US 3,129,141) and Chayka (US 5952046) for the reasons of record set forth in paragraph 15 of the Office Action mailed on 2/9/2007.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carley-Macaulay et al in view of Nicholson et al and Mysels, and further in view of GB '789 for the reasons of record set forth in paragraph 16 of the Office Action mailed on 2/9/2007.

Response to Arguments

10. Applicants' arguments filed October 18, 2007 have been fully considered but they are not persuasive.

1. Rejection of Claim 11 Under 35 U.S.C §112 First Paragraph

The Examiner has rejected claim 11 under 35 U.S.C. § 112, first paragraph, as allegedly lacking enablement. According to the Examiner, the specification, while enabling for increased thermal conductivity of 50% for a 10% volume loading of silicon carbide, does not reasonably provide

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enablement for at least 5% increase compared to that of a fuel arrangement from pure uranium dioxide.

The argument is unconvincing because the Applicants' specification does not reasonably provide enablement for **unlimited** increase of thermal conductivity compared to that of a fuel arrangement from pure uranium dioxide.

2. Rejection of Claim 11 under 35 U.S.C §112 Second Paragraph

The rejection has been withdrawn due to amendment.

3. Rejection of Claims 1, 2, 4, 6-9, 11-12 under 35 U.S.C. §103(a).

Rejection over GB1035789 in view of Carley-Macauley et al.

(A) Applicant submits that claimed nuclear fuel body for use in a light water reactor is significantly different from the nuclear fuel bodies for use in a High Temperature Graphite Reactor (HTGR) as disclosed in the cited references. Moreover, the graphite based, nuclear fuel material disclosed in the cited references cannot be used in the light water reactor as claimed. For this reason alone the method of preparing a nuclear fuel as in the claimed invention is clearly distinct from and not taught or suggested by the cited references.

The Examiner respectfully disagrees with this argument. First of all, in contrast to Applicants argument, GB'789 teaches that the finished nuclear fuel body can be directly incorporated into a high temperature nuclear reactor of the HTGR or **other type** (See page 5, lines 84-93). Second, the Examiner takes official notice that uranium dioxide fuel of the cited prior art would be suitable for use in light water reactor since Applicants' specification discloses that even a conventional uranium dioxide is satisfactory for use in light water reactor (See page 1, lines 17-18). Moreover, GB'789 teaches that the finished nuclear fuel body can be directly

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incorporated into a reactor of (**any**) type, and is capable of substantially retaining gaseous fission products at temperatures in excess of 1000⁰C over extended periods of time, and durable and stable (See page 5, lines 84-93).

(B) Applicant asserts that one skilled in the art would immediately understand from reading the specification that the term “porous uranium dioxide arrangement” refers to a uranium dioxide matrix that is porous. On page 3, lines 16 to 27, of the specification the uranium dioxide arrangement is described as a uranium dioxide matrix. For example in lines 16 and 17 the liquid precursor liquid (impregnant) is penetrating a uranium dioxide matrix and in lines 24-27 “incorporation of the precursor liquid into all of the pores in the uranium dioxide matrix” is described. Moreover, the result of the claimed process is the incorporation of silicon carbide into the matrix of uranium dioxide as disclosed on page 4, lines 14-15 of the specification. For these reasons, applicant submits that the Examiner's interpretation of the term uranium dioxide arrangement in claim 1 is inconsistent with the disclosure in the specification with respect to a uranium dioxide arrangement and the use of the term uranium dioxide matrix therein.

The Examiner respectfully disagrees with this argument. First of all, claim 1 does not recite that “a porous uranium dioxide arrangement” comprises uranium dioxide *matrix* and silicon carbide interspersed in the matrix of uranium dioxide, as described in the Applicants' specification on page 3, lines 19-20. The Applicants' specification also does not define the term “a porous uranium dioxide arrangement” as being confined only to uranium dioxide *matrix* with silicon carbide interspersed in the matrix of uranium dioxide. Second, it is well settled that claims are to be given their *broadest* reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997).

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Limitations appearing in the specification but **not recited in the claim** should not be read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted “in view of the specification” *without importing* limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim. Any special meaning assigned to a term “must be sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention.” Multifarm Desiccants Inc. v. Medzam Ltd., 133 F.3d 1473, 1477, 45 USPQ2d 1429, 1432 (Fed. Cir. 1998).

For these reasons, the term, “a porous uranium dioxide arrangement” was given its *broadest* reasonable interpretation. Therefore, one skilled in the art would immediately understand from reading the specification that the term “porous uranium dioxide arrangement” in claim 1 should be given its *broadest* reasonable interpretation.

(C) Applicants argue that in contrast to a porous nuclear fuel which is being impregnated with a polymerizable substance it is the porous graphite matrix which contains protectively coated nuclear fuel particles that is being impregnated with a polymerizable substance in the method disclosed in GB'789, the nuclear fuel material in disclosed GB '789 is protected against impregnation with a polymerizable substance and specifically excludes uranium dioxide.

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The Examiner respectfully disagrees with this argument. In contrast to Applicants argument, claim 1 recites impregnating uranium dioxide *arrangement*, NOT uranium dioxide *matrix*.

(D) Applicants argue that Carley-Macauley et al disclose a method of pyrolytically carbonizing a carbon based nuclear fuel body, which comprises particles of a metal oxide or carbide, by impregnating the nuclear fuel body with a gas, not a liquid precursor. Although the disclosure in Carley- Macauly et al describes that both metal oxides and carbides may be used it is highly recommended that metal carbides are used as nuclear fuel particles.

The argument is unconvincing because Carley-Macauly et al is a *secondary* reference here, which is relied upon to show teach that uranium dioxide or uranium carbide can be used as a nuclear fuel element (See column 2, lines 61-68).

4. Rejection of Claims 1, 2, 4, 6-9, 11-12 under 35 U.S.C. §103(a).

Rejection over Carley-Macauley et al in combination with Nicholson et al and Mysels

(A) Applicant asserts that Carley-Macauley et al do not disclose the claimed method of infiltrating a liquid precursor material in a porous uranium dioxide, and Nicholson et al and Mysels do not cure this failure. In Nicholson et al, impregnating techniques using a liquid precursor are only disclosed to deposit carbon in silicon carbide bodies; and the silicon carbide bodies prepared by the method disclosed in Nicholson et al are not nuclear fuel bodies, let alone porous uranium dioxide nuclear fuel. Therefore, there is no motivation to combine the teachings of Carley-Macauley et al with Nicholson et al. Mysels discloses a method of preparing a nuclear

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fuel element by impregnating a porous graphite block containing nuclear fuel chambers with a carbonizable impregnant which penetrates the fuel chambers.

The Examiner respectfully disagrees with this argument. Nicholson et al is a *secondary* reference which is relied upon to show that carbon can be deposited in the pores of substantially *any* refractory body having intercommunicating network by either pyrolysis of gas or impregnation of the porous body with phenol-formaldehyde resin or furfural or -the like, followed by carbonization by acidification. Mysels is also a *secondary* reference which is relied upon to show teaches that carbon can be deposited in the pores in a fuel arrangement from impregnant such as phenol-formaldehyde prepolymer or furfuryl alcohol monomer/prepolymer by **curing** first the prepolymer and decomposing the cured polymer at temperature of 200-800⁰C and carbonizing at 1200⁰C or **higher** (claimed firing). Therefore, there is clear motivation to combine Carley-Macauley et al with Nicholson et al and Mysels.

It is held that rationale different from applicant is permissible. The reason or motivation to modify the reference may often suggest what the inventor has done, but for a *different purpose or to solve a different problem*. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant.

(B) Applicant asserts that the primary reference Cafley-Macauley et al teaches away from impregnating a nuclear fuel body with a polymerizable substance because suitable gasses for penetrating the nuclear fuel body are selected specifically to minimize the risk of polymerization, whereas the secondary reference Mysels teaches the impregnating a nuclear fuel chamber in a nuclear fuel body with a polymerizable precursor liquid. Nicholson the other secondary reference, is not directed to preparing a nuclear fuel body but to preparing silicon

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impregnated silicon carbide bodies which are not suitable for use as a nuclear fuel body. The silicon nitride with which the silicon carbide bodies are impregnated with is characterized as a solid as opposed to a gas as in Carley-Macauley et al or Mysels.

The Examiner respectfully disagrees with this argument. First of all, Cafley-Macauley et al teach that non-polymerizable hydrocarbons are *preferred* (See column 4; lines 36-38) but olefins may be also used (See column 4, lines 48-55). In other words, in contrast to Applicants argument, Cafley-Macauley et al does not teach away from impregnating a nuclear fuel body with a polymerizable substance such as olefins (See column 4, lines 52-53).

As to Nicholson and Mysels, See above.

5. Rejection of Claims 2 and 10 under 35 U.S.C. §103(a).

Rejection over GB1035789 in view of Carley-Macauley et al/ Carley-Macauley et al in view of Nicholson et al and Mysels/, and further in view of Burnham et al (US 3,129,141) and Chayka (US 5,952,046).

As described above, Applicant submits that GB '789 in view of Carley-Macauley et al does not teach or suggest, nor is there motivation to combine Carley-Macauley et al with NicholSEN et al and Mysels to teach or suggest the method of independent claim 1. Burnham et al is directed to a method of preparing a nuclear fuel element comprising a dense body of uranium carbide, graphite, silicon carbide and silicon. Thus, Burnham et al also disclose a nuclear fuel for use in a High Temperature Graphite Reactor based on graphite, which nuclear fuel cannot be used in a light water reactor as the claimed invention. The material obtained by the process of Burnham et al therefore is a silicon carbide as base material and incorporated therein the nuclear fuel material as described in column 1, lines 23- 29. Therefore, Burnham et al does not teach or

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suggest infiltrating porous uranium dioxide with a liquid precursor material. Chayka is directed to the chemical vapor deposition of silicon carbide or carbide on substrates, and does not teach infiltrating and curing a liquid precursor in a nuclear fuel body or material.

The Examiner respectfully disagrees with this argument. Burnham et al is a *secondary* reference which is relied upon to show that it is desirable that a nuclear fuel element comprises a dense body of uranium carbide, graphite, silicon carbide and silicon. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a silicon carbide instead or **in addition to graphite** in the cited prior art in with the expectation of providing the desired dense body. Therefore, there is a clear motivation to combine the cited prior art with Burnham.

In contrast to Applicants argument, Chayka is a *secondary* reference which is cited for teaching that HPCS is commercially available (liquid) monomer *polymerizable* to AHPCS (See column 9, lines 36-42). Therefore, HPCS is suitable for the use as a liquid precursor for forming a cured polymer in a method of the cited prior art. It is held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

6. Rejection of Claim 11 under 35 U.S.C. §103(a).

Applicant submits that the cited references fail to teach or suggest, either alone or in combination the claimed method as in independent claim 1, as amended, from which claim 11 depends.

The Examiner respectfully disagrees with this argument for the reasons discussed above.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Thursday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy, Ph.D.
Primary Examiner
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November 1, 2007